

REMARKS

The present amendment is prepared in accordance with the requirements of 37 C.F.R. § 1.121. A complete listing of all the claims in the application is shown above showing the status of each claim. For current amendments, inserted material is underlined and deleted material has a line therethrough.

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

The claims have been amended for antecedent basis errors and clarification purposes.

No new matter has been added.

Specification and Claim Objections

In the above office action, the Examiner has objected to the term "soluble salt, such as KOH" in paragraphs 0019 and 0045 of the specification, stating that the recitation "salt" is not a proper term for KOH. Applicants respectfully disagree since it is common knowledge that alkalis are basic ionic salts of an alkali metal (PH value of greater than 7) Alkalis are best known for being bases (compounds with pH greater than 7) that dissolve in water, of which a common example is potassium hydroxide (i.e., KOH which is often called "potash"). Attached hereto is an Internet printout defining KOH as a "salt".

Claim 12 has been objected to on the grounds of reciting a soluble salt consisting of KOH. In view of the above remarks and the attached documents, it is

submitted that KOH is a soluble salt, and as such, the objection of claim 12 is now moot.

The Examiner has also objected to claim 13. Applicants have amended claim 13 to depend from claim 11, and have clarified that it is the solvent of the present invention that may include aliphatic hydrocarbons, naphthenic hydrocarbons, aromatic hydrocarbons and combinations thereof. Support is found at paragraph [0049] of the specification.

No new matter has been added.

Claim Rejections - 35 USC § 102

Stephanie et al (U.S. Patent No. 5,891,257)

The Examiner has rejected claims 1-4 under 35 U.S.C. 102(b) as being anticipated by Stephanie et al (U.S. Patent No. 5,891,257).

Applicants disagree.

Stephanie et al. discloses a tool 12 for removing encapsulants and protective coatings from a circuit board assembly. A flow head 14 of the tool 12 has a support 22 with an opening 22' adapted to contact a circuit board and flow solvent to the surface of the board. (Col. 3, ll. 33-46 and FIG. 3.) A solvent nozzle 24 of the flow head 14 has an opening 24' to apply solvent to the circuit board assembly. (Col. 3, ll. 50-54.) The nozzle opening 24' is positioned beneath the support opening 22' to provide scrubbing action during the application of solvent to the circuit board assembly 30. (Col. 3, ll. 55-57.) The scrubbing action is effective in removing the resin from the particular intended device. (Col. 5, ll. 2-4.) The solvent may be

ethylene glycol, n-butyl alcohol, xylene and mixtures thereof, or trifluoroethanol, with methane sulfonic acid added to any of such solvents. (Col. 5, l. 65 to col. 6, l. 2.)

In the method of Stephanie et al., the solvent is heated, and the flow head 14 is raised so that the support 22 contacts substrate assembly 30. (Col. 7., l. 62 to col. 8, l. 13-25.) The solvent flows over the encapsulated chip 30' and the flow head 14 is lowered to remove encapsulation. (Col. 8, ll. 13-25.) The encapsulants may be dissolved by hydrolysis or by trans-etherification of the epoxy using an alcohol, an acid, and an organic solvent. (Col. 8, ll. 43-55.) The solvent comprises 10-100 parts, preferably about 30 parts, of a primary alcohol as exemplified by ethanol, methanol, n-butanol, and n-propanol; 0-90 parts, preferably about 30 parts, of a less polar organic solvent as exemplified by benzyl alcohol, xylene, toluene; and one to ten parts, preferably about 3 parts of an organic acid as exemplified by methanesulfonic acid, p-toluenesulfonic acid and trifluoromethanesulfonic acid. Additionally, about 30 parts of ethylene glycol is used in the solvent, and optionally a surfactant and/or a corrosion inhibitor. (Col. 9, ll. 18-28.)

Applicants submit that the present invention is not anticipated by Stephanie. Anticipation is but the ultimate or epitome of obviousness. To constitute anticipation, all material elements of a claim must be found in one prior art source. *In re Marshall*, 577 F.2d 301, 198 USPQ 344 (CCPA 1978).

As is currently claimed, the method of independent claim 1 is directed to locally remove polymer sealant from a semiconductor device by providing a component having a thermoset polymer sealant on a surface thereof and detecting the

thermoset polymer sealant on a portion of such surface. Bulk thermoset polymer sealant is removed, and residual thermoset polymer sealant remaining on such portion of the surface is detected after the bulk thermoset polymer sealant has been removed. The substrate is heated to a temperature under the boiling point of the solvent of the solution, and a depolymerization cleaning solution is locally applied substantially only to the residual thermoset polymer sealant in an amount sufficient to at least cover the residual thermoset polymer sealant. An essential feature of the invention is that this depolymerization cleaning solution is a salt saturated solvent having surfactant. The residual thermoset polymer sealant is contacted with the present depolymerization cleaning solution to chemically degrade such residual thermoset polymer sealant for the removal thereof. The degraded residual thermoset polymer sealant is then removed from the surface of the component.

It is respectfully submitted that Stephanie et al. does not disclose a cleaning solution of a salt saturated solvent having surfactant, as is currently claimed. Rather, the solvent of Stephanie et al. for removing a resin is limited to an alcohol, an acid, and an organic solvent, and optionally a surfactant and/or or a corrosion inhibitor. (Col. 5, l. 65 to col. 6, l. 2, col. 8, ll. 43-55, and col. 9, ll. 1-28.) Stephanie et al. discloses that a scrubbing action via nozzle 24' is used in combination with its solvent for the effective removal of the resin. (Col. 5, ll. 2-4, and col. 5, l. 65 to col. 6, l. 2.) Applicants submit that there is no disclosure or suggestion in Stephanie et al. that it's solvent includes a salt, and more over, that it is a *salt saturated solvent* having surfactant for degrading and removing a thermoset polymer sealant. Moreover,

Stephanie et al. does not disclose or contemplate the steps of first removing bulk thermoset polymer sealant and then detecting any residual thermoset polymer sealant for the removal thereof, as is currently claimed.

Accordingly, it is submitted that the claims of the instant invention include limitations not disclosed nor contemplated by Stephanie et al. such that Stephanie et al. does not anticipate nor render obvious the instant invention.

Sachdev (U.S. Publication No. 2002/0000239)

The Examiner has also rejected claims 1, 5, 7, 10, 11, 14 under 35 U.S.C. 102(a/e) as being anticipated by Sachdev (U.S. Publication No. 2002/0000239). Applicants disagree.

It is again submitted that the present invention is directed to locally remove polymer sealant from a semiconductor device by providing a component having a thermoset polymer sealant on a surface thereof and detecting the thermoset polymer sealant on a portion of such surface. Bulk thermoset polymer sealant is removed, and residual thermoset polymer sealant remaining on such portion of the surface is detected after the bulk thermoset polymer sealant has been removed. The substrate is heated to a temperature under the boiling point of the solvent of the solution, and a depolymerization cleaning solution is locally applied substantially only to the residual thermoset polymer sealant in an amount sufficient to at least cover the residual thermoset polymer sealant. An essential feature of the invention is that this depolymerization cleaning solution is a salt saturated solvent having surfactant. The residual thermoset polymer sealant is contacted with the present depolymerization

cleaning solution to chemically degrade such residual thermoset polymer sealant for the removal thereof. The degraded residual thermoset polymer sealant is then removed from the surface of the component.

To constitute anticipation, all material elements of a claim must be found in one prior art source. *In re Marshall*, 577 F.2d 301, 198 USPQ 344 (CCPA 1978). It is submitted that the present invention is not anticipated by Sachdev. Anticipation is but the ultimate or epitome of obviousness.

Sachdev discloses a stripping composition and a method of using the stripping composition to remove cured resins, where the stripping compositions comprises an organic base such as a quaternary ammonium hydroxide, a surfactant and a high boiling solvent such as di- or tri-propylene glycol alkyl ether. (Abstract.) The surfactant is preferably a non-ionic surfactant including alkyl aryl polyether, fluoroalkyl polyethers, polyalkyl glycosides or alkyl ethoxylated alcohol which surfactants are known to be biodegradable. (Sachdev, Paragraph [0051].) Another stripping composition is a base, preferably an aliphatic quaternary ammonium hydroxide and at least two (2) pyrrolidone materials such as N-methylpyrrolidone (NMP) and N-cyclohexylpyrrolidone (CHP), with or without a surfactant. (Sachdev, Paragraph [0052].)

It is submitted that Sachdev does not disclose a depolymerization cleaning solution of a *salt saturated* solvent having surfactant, as is currently claimed. On the contrary, the stripping composition of Sachdev includes a quaternary ammonium hydroxide, preferably tetraalkyl ammonium hydroxide, which is not a salt itself, but

rather participates in the usual acid-base reactions to form ammonium salts (e.g., $\text{H}_2\text{CO}_3(\text{aq}) + \text{NH}_4\text{OH}(\text{aq}) = \text{NH}_4\text{HCO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$; carbonic acid reacts with ammonium hydroxide to form an ammonium salt (i.e., bicarbonate salt) and water). Also, the tetraalkyl ammonium hydroxide does not saturate the solution. It is only present in an effective amount of about 0.5-5% by weight based on anhydrous material. (Sachdev, Paragraph [0053].)

As such, the depolymerization cleaning solution of the invention is technically different and distinct from the stripping composition of Sachdev. To evidence the same, Sachdev discloses that parts are treated with its stripping composition for 30 minutes up to about 2 hours to 8 hours, or more typically for about 60 to 90 minutes. (Sachdev, Paragraphs [0026] and [0062].) On the contrary, the depolymerization cleaning solution of the invention is allowed to remain on the surface for a sufficient time of about 5 minutes to about 25 minutes for the depolymerization of the residual thermoset polymer sealant, as is currently recited in claim 7.

Applicants respectfully submit that the claims of the instant invention include limitations not disclosed nor contemplated by Sachdev such that Sachdev does not anticipate nor render obvious the instant invention

Section 103 Issues

Claims 5-9

The Examiner has also rejected claims 5-9 under 35 U.S.C. 103(a) as being unpatentable over Stephanie et al. The limitations of claim 5 (which is now canceled) are included in independent claim 1. Claims 6-9 all ultimately depend from claim 1.

As discussed above, the present invention is directed to locally removing polymer sealant from a semiconductor device by providing a component having a thermoset polymer sealant on a surface thereof and detecting the thermoset polymer sealant on a portion of such surface. Bulk polymer sealant is removed, and once removed, residual thermoset polymer sealant is then detected on the surface. The substrate is heated, and a depolymerization cleaning solution is locally applied to the residual thermoset polymer sealant in an amount sufficient to at least cover the residual thermoset polymer sealant. Again, the depolymerization cleaning solution is a salt saturated solvent having surfactant. Residual sealant is contacted with the salt saturated depolymerization cleaning solution for the chemical degradation thereof, and removal of such degraded sealant.

Applicants submit that Stephanie et al. does not disclose, contemplate or suggest detecting and removing bulk thermoset polymer sealant and then detecting residual thermoset polymer sealant for the removal thereof. Rather, it discloses a tool 12 having a flow head 14 with a solvent nozzle 24 that has an opening 24' to apply solvent to the circuit board as well as to provide a scrubbing action during the application of solvent for the effective removal of the resin from the device. (Col. 3, ll. 33-57 and col. 5, ll. 2-4.) That is, Stephanie et al. uses the scrubbing action of the solvent nozzle opening 24' to remove resin, including the bulk thereof. Stephanie et al. does not contemplate first removing bulk resin prior to any subsequent resin removal. For the reasons as discussed above, applicants also submit that Stephanie et

al. does not disclose or suggest a salt saturated solvent having surfactant for the removal of a resin.

Applicants submit that Stephanie et al. would not render obvious the present invention since obviousness is tested by what the combined teaching of the references would have suggested to those of ordinary skill in the art (*In re Keller*, 642 F.2d 413, 425, 208 U.S.P.Q. 871, 881 (CCPA 1981)) and cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination (*ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984)). Further, it is submitted that the Examiner has relied on hindsight in reaching the present obviousness determination, which of course, is impermissible. (See, *W.L. Gore & Assoc. v. Garlock*, 721 F.2d 1540, 1553 [220 USPQ 303] (Fed. Cir. 1983) (Approaches to obviousness determinations which focus merely on identifying and tabulating "missing elements" in hindsight retrospect "imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge," and, "fall victim to the insidious effect of hindsight syndrome where that which only the inventor taught is used against its teacher.")).


Claim 12

The Examiner has also rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over Stephanie et al (U.S. Patent No. 5,891,257).in view of Sachdev (U.S. Publication No. 200210000239). Applicants disagree.

For the reasons as discussed above, it is submitted that neither Stephanie et al. nor Sachdev, alone or in combination, disclose, contemplate or suggest a depolymerization cleaning solution of a salt saturated solvent having surfactant that is locally applied substantially only to the residual thermoset polymer sealant for the degradation and removal thereof, as is currently claimed. That is, neither cited reference discloses or even suggests that their respective solutions have a soluble salt therein, moreover, that such solutions are saturated with such salts.

It is for these reasons that applicants submit that the present invention would not have been obvious to one of ordinary skill in the art at the time of the invention under section 103. Applicants submit that the application has now been brought into a condition where allowance of the case is proper. Reconsideration and issuance of a Notice of Allowance are respectfully solicited. Should the Examiner not find the claims to be allowable, Applicants' attorney respectfully requests that the Examiner call the undersigned to clarify any issue and/or to place the case in condition for allowance.

Respectfully submitted,



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Alkali

From Wikipedia, the free encyclopedia

In chemistry, an **alkali** (from Arabic: *al-qaly* القلي, القلوي) is a basic, ionic salt of an alkali metal or alkaline earth metal element. Alkalis are best known for being bases (compounds with pH greater than 7) that dissolve in water. The adjective **alkaline** is commonly used in English as a synonym for base, especially for soluble bases. This broad use of the term is likely because alkalis were the first bases known to obey the Arrhenius definition of a base and are still among the more common bases. Since Brønsted-Lowry acid-base theory, the term alkali in chemistry is normally restricted to those salts containing alkali and alkaline earth metal elements.

Contents

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Common properties of alkalis

Alkalis are all Arrhenius bases and share many properties with other chemicals in this group (Arrhenius bases form hydroxide ions when dissolved in water). Common properties of alkaline aqueous solutions include:

- All alkalis have a pH greater than seven and hence can be detected with litmus paper (moist red litmus will turn blue on contact with an alkali).
- Moderately concentrated solutions (over 10^{-3} M) have a pH of 10 or greater. This means that they will turn phenolphthalein from colorless to pink.
- Concentrated solutions are caustic (causing chemical burns).
- Alkaline solutions are slippery or soapy to the touch, due to the saponification of the fatty acids on the surface of the skin.
- Alkalis are normally water soluble, although some like barium carbonate are only soluble when reacting with an acidic aqueous solution.

Confusion between base and alkali

The terms "base" and "alkali" are often used interchangeably, since most common bases are alkalis. It is common to speak of "measuring the alkalinity of soil" when what is actually meant is the measurement of

the pH (base property). Similarly, bases which are not alkalis, such as ammonia, are sometimes erroneously referred to as alkaline.

Note that not all or even most salts formed by alkali metals are alkaline; this designation applies only to those salts which are basic.

While most electropositive metal oxides are basic, only the soluble alkali metal and alkaline earth metal oxides can be correctly called alkalis.

Alkalies can include Lye. This definition of an alkali as a basic salt of an alkali metal or alkaline earth metal does appear to be the most common, based on dictionary definitions [1]

(<http://en.wiktionary.org/wiki/alkali>) [2] (<http://dictionary.reference.com/search?q=alkali>) , however conflicting definitions of the term alkali do exist. These include:

- Any base that is water soluble and [3] (<http://www.tiscali.co.uk/reference/encyclopaedia/hutchinson/m0029936.html>) [4] (<http://www.thefreedictionary.com/alkali>) . This is more accurately called an Arrhenius base.
- The solution of a base in water [5] (<http://www.krysstal.com/acidbase.html>) .

Alkali salts

Most basic salts are alkali salts, of which common examples are:

- sodium hydroxide (often called "caustic soda")
- potassium hydroxide (commonly called "potash")
- lye (generic term, for either of the previous two, or even for a mixture)
- calcium carbonate (sometimes called "free lime")
- magnesium hydroxide is an example of an atypical alkali: it is a weak base (cannot be detected by phenolphthalein) and it has low solubility in water

Alkaline soil

Soil with a pH value higher than 7.3 is normally referred to as alkaline. This soil property can occur naturally, due to the presence of alkali salts. Although some plants do prefer slightly basic soil (including vegetables like cabbage and fodder like buffalograss), most plants prefer a mildly acidic soil (pH between 6.0 and 6.8), and alkaline soils can cause problems.

Alkali lakes

In alkali lakes (a type of salt lake), evaporation concentrates the naturally occurring alkali salts, often forming a crust of mildly basic salt across a large area.

Examples of alkali lakes:

- Redberry Lake, Saskatchewan, Canada.
- Tramping Lake, Saskatchewan, Canada.
- Mono lake, California, United States of America

Etymology

The word "alkali" is derived from Arabic *al qalīy* = "the calcined ashes", referring to the original source of alkaline substance. Ashes were used in conjunction with animal fat to produce soap, a process known as saponification.

Retrieved from "<http://en.wikipedia.org/wiki/Alkali>"

Categories: Inorganic chemistry | Arabic words and phrases

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